Transportation Synthesis Report

Nina McLawhorn
Research Administrator
Wisconsin Department of Transportation
608-266-3199
nina.mclawhorn@dot.state.wi.us

Nighttime Highway Construction

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Division of Highway Infrastructure Development
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Transportation Synthesis Reports (TSRs) are brief summaries of currently available information on topics of interest to WisDOT technical staff in highway development, construction and operations. Online and print sources include NCHRP and other TRB programs, AASHTO, the research and practices of other state DOTs, and related academic and industry research.

REQUEST FOR REPORT

WisDOT has received inquiries about increased use of nighttime construction to minimize driver delays. The RD&T Program was asked to review available information on the topic of nighttime construction that might serve as a resource for district communication managers, DTID experts in highway construction and maintenance, and other WisDOT staff.

SUMMARY

- The recently completed NCHRP Report 475, *A Procedure for Assessing and Planning Nighttime Highway Construction and Maintenance*, is now available on TRB's Web site at http://gulliver.trb.org/publications/nchrp/nchrp_rpt_475.pdf. It provides a comprehensive, quantitative basis for selecting the most cost-effective plan for ensuring the safety of the public and workers, maintaining capacity, minimizing the impact on the community, and getting the work completed on schedule. See Highlights below. Volume II of this work, *Guidelines for Design and Operation of Nighttime Traffic Control for Highway Maintenance and Construction*, will be published separately as NCHRP Report 476.
- A review of the literature and discussions with TRB staff and others indicates there is strong interest in this issue. A valuable overview may be found in *Nighttime Construction Issues*, a TRB paper by Donn Hancher and Timothy Taylor. The paper summarizes information from a survey of state DOTs and Kentucky contractors and state engineers. See Highlights below.
- Illinois has contracted with Bradley University to carry out a similar survey, and research has been completed or is under way on key issues related to nighttime construction such as safety, lighting and project selection. See Other Reports and Articles and Research in Progress below.
- Some guidance and minimum requirements for dealing with nighttime work are provided in the *Manual on Uniform Traffic Control Devices*.
- DTID's Tom Notbohm (266-0982) serves on the technical panel for Project 17-17, which resulted in NCHRP Report 475, as well as on the panel for the Midwest States Smart Work Zone Deployment Initiative. He is an excellent resource for practical information on nighttime construction issues.

Highlights from *A Procedure for Assessing and Planning Nighttime Highway Construction and Maintenance*, NCHRP Report 475, 2002, James Bryden and Douglas Mace.

- Section I reviews basic principles of work zone traffic control and provides a flow chart of Procedural Steps to Analyze Traffic Control Options Including Night Work (p. 7).
- Section 2 describes necessary information gathering requirements with reference to the National Highway Institute Course, *Developing Traffic Control Strategies* and to the *Manual on Uniform Traffic Control Devices*.
- Sections 5 and 6 provide guidance in analyzing the cost-effectiveness of nighttime construction with sample worksheets and illustrative examples.
- Appendixes contain information on traditional and non-traditional traffic control plans, estimating user costs associated with work zone traffic control and evaluating accident costs.

Highlights from *Nighttime Construction Issues*, Paper No. 01-0273, Transportation Research Record 1761, 2001, Donn Hancher and Timothy Taylor.

- Results from this survey confirmed the common perception that the main reason for using night work was high daytime traffic levels and that the cost of night work is generally higher than similar daytime construction activities.
- However, safety was rated as not affected even though it was frequently cited as one of the primary disadvantages of night work.
- Overall the results indicate that the success or failure of night work varies depending on the type of work being performed, the experience of the contractor with performing night work and the location of the project.
- Nearly fifty factors affecting nighttime construction are identified and grouped in seven parameters related to: traffic, construction, social, economic, environmental, DOT and legal.
- A two-page decision-making tool is provided for deciding when to carry out nighttime construction.
- The authors make a number of detailed recommendations for night work, such as a contractor work plan, limited length of lane closures, police enforcement of construction-zone speed limits, signage, temporary speed bumps, a full-time traffic control monitor and nighttime training for workers.

OTHER REPORTS AND ARTICLES

Guidelines for Nighttime Maintenance and Construction Operations, Road and Transport Research, September 1998, Ossama Abd. Elrahman and Robert Perry.
These guidelines were expanded and incorporated in the *Nighttime Construction Issues* paper.

Developing Procedures for Night Operations of Transportation Construction Projects, Transportation Research Center, University of Florida, 1993.

NCHRP Synthesis of Highway Practice 218: Mitigation of Nighttime Construction Noise, Vibrations and Other Nuisances, TRB, National Research Council, 1999.

A Procedure for Assessing and Planning Nighttime Highway Construction and Maintenance, 2nd Draft, The Last Resource, Bellefonte, PA. July 1999.

Guidelines for Design and Operation of Nighttime Traffic Control for Highway Maintenance and Construction, 2nd Draft, The Last Resource, Bellefonte, PA, April 1999.

New Jersey Night Work: Better Light Boosts Productivity, Quality, Pavement Maintenance & Reconstruction, February 1999.

State DOTs and Contractors Show Winning Ways, HMAT, 1999.
Highlights 32 projects that won 1998 National Asphalt Pavement Association Quality in Construction Awards. A majority of the work, whether rehabilitation or new construction, involved **night paving**, restricted hours, or phased construction to limit disruption of traffic flow.

RESEARCH IN PROGRESS

***Illumination Guidelines for Nighttime Highway Work*,** NCHRP Project 5-13(2), FY 1996, Ralph Ellis.
Examines the critical role of temporary roadway lighting at nighttime construction sites for both workers and drivers. Final report available in July 2002.

Illinois DOT. ***Nighttime Construction: Evaluation of Construction Operations***, Bradley University, Gene Rebholz.
This study will survey the amount of nighttime construction being conducted nationwide, particularly in Illinois, determine the advantages and disadvantages, and identify most suitable operations for nighttime construction based on cost, productivity, efficiency and quality. Scheduled for completion in August 2003.

Illinois DOT. ***Nighttime Construction: Evaluation of Lighting for Highway Construction Operations***.
This study will survey work zone lighting practices in Illinois and other states. Design criteria for acceptable performance will be evaluated and recommendations made. Scheduled for completion in August 2003.

Illinois DOT. ***Nighttime Construction: Evaluation of Worker Safety Issues***, Illinois Institute of Technology, David Arditi.
This study will identify and measure the effects of nighttime construction conditions on worker visibility and investigate the performance of different high-visibility garments under different lighting and weather conditions. Scheduled for completion in February 2003.

Oregon DOT. ***Selection Criteria for Using Nighttime Construction and Maintenance Operations***, ODOT, Kevin Haas.
This study will use existing research to identify and evaluate factors affecting nighttime construction and test a decision model for evaluating the feasibility of nighttime operations. Scheduled for completion in September 2002

CONTACTS

Ralph Ellis, Jr., University of Florida, 352-392-3730, rellis@ce.ufl.edu. Principal investigator for NCHRP Project 5-13(2).
Donn Hancher, University of Kentucky, 859-257-4857, hancher@engr.uky.edu. Co-author of *Nighttime Construction Issues*, past chair of TRB Committee A2F05 on Construction Management.
Amir Hanna, TRB staff, Senior Program Officer, 202-334-1892, ahanna@nas.edu. Responsible for release of the *Illumination Guidelines* study.
Fred Hejl, TRB staff, Committee A2F05 on Construction Management, 202-334-2953, fhejl@nas.edu. Committee A2F05 sponsored publication of the *Nighttime Construction Issues* study.
Cliff Schexnayder, Arizona State University, 480-965-5133, cliff.s@asu.edu. Author of *NCHRP Synthesis of Highway Practice 218: Mitigation of Nighttime Construction Noise, Vibrations and Other Nuisances*.